

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
10 February 2005 (10.02.2005)

PCT

(10) International Publication Number  
**WO 2005/013403 A2**

(51) International Patent Classification<sup>7</sup>: H01M 8/06, (81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number: PCT/US2004/023889

(22) International Filing Date: 23 July 2004 (23.07.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 60/490,055 25 July 2003 (25.07.2003) US

(71) Applicant (*for all designated States except US*): WORCESTER POLYTECHNIC INSTITUTE [US/US]; 100 Institute Road, Worcester, MA 01609 (US).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): DATTA, Ravindra [US/US]; 3 Rutland Terrace, Worcester, MA 01609 (US). ZHANG, Jingxin [CN/US]; 34 Bowdoin Street, Worcester, MA 01609 (US).

(74) Agent: PIERCE, N. Scott; Hamilton, Brook, Smith & Reynolds, P.C., 530 Virginia Road, P.O. Box 9133, Concord, MA 01742-9133 (US).

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2005/013403 A2

(54) Title: ELECTROCHEMICAL PREFERENTIAL OXIDATION OF CARBON MONOXIDE FROM REFORMATE

(57) Abstract: An electrochemical device comprises an electrochemical reactor that includes a single or multiple electrochemical cells and a galvanostat, a gas source and a fuel cell system. Each of the electrochemical cells includes an anode compartment and a cathode compartment. The gas source is in fluid communication with the anode or cathode compartment of each of the electrochemical cells, including at least two components that are selectively reactive relative to each other. The selectivity of the two components of the gas source is dependent upon an electrical potential between an anode of the anode compartment and a cathode of the cathode compartment, whereby a constant current between the anode and cathode causes the electrical potential to oscillate autonomously while the gas components are directed through the anode or cathode compartment. The oscillation in potential causes autonomous oscillation of selective reaction of the gas components.